

**National Climatic Data Center**

**DATA DOCUMENTATION**

**FOR**

**DATA SET 1138 (DSI-1138)**

**NDBC BUOY OBSERVATIONS ARCHIVE FORMAT**

**March 20, 2003**

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1. **Abstract:** Moored buoys are the weather sentinels of the sea. They are deployed in the coastal and offshore waters from the western Atlantic to the Pacific Ocean around Hawaii, and from the Bering Sea to the South Pacific. [National Data Buoy Center's](#) (NDBC) moored buoys measure and transmit barometric pressure; wind direction, speed, and gust; air and sea temperature; and wave energy spectra from which significant wave height, dominant wave period, and average wave period are derived. Even the direction of wave propagation is measured on many moored buoys.

NDBC's fleet of moored buoys includes 4 types: 3-m, 10-m, 12-m discus hulls, and 6-m boat-shaped (NOMAD) hulls. The choice of hull type used usually depends on its intended deployment location and measurement requirements. To assure optimum performance, a specific mooring design is produced based on hull type, location, and water depth. For example, a smaller buoy in shallow coastal waters may be moored using an all-chain mooring. On the other hand, a large discus buoy deployed in the deep ocean may require a combination of chain, nylon, and buoyant polypropylene materials designed for many years of service. Some deep ocean moorings have operated without failure for over 10 years.

In addition to their use in operational forecasting, warnings, and atmospheric models, moored buoy data are used for scientific and research programs, emergency response to chemical spills, legal proceedings, and engineering design.

The major parameters that make up this data file are: air and dew point temperature (Deg. C to 10ths), sea level pressure (MB to 10ths), wind direction (degrees to 10ths), wind speed (meters/sec. to hundredths), current weather (coded), visibility (nautical miles to 10ths), precipitation (accumulation in mm), solar radiation (if available, in Langleys per minute), sea surface temperature (Deg. C to hundredths), significant wave height (meters to 10ths) and average wave period (seconds to 10ths). Also included are wave spectra data including frequency (center frequency of interval in Hertz to thousandths), resolution (resolution of interval in Hertz to ten-thousandths), and density (spectral density of interval in M5424/Hz to thousandths).

Forecasts and the issuances of watches and warnings by the National Weather Services (NWS) in the marine and coastal areas of the United States depend, for the most part, on meteorological observations. The marine environment poses unique problems to the acquisition and collection of these observations. New electronic hardware had to be developed by the NOAA Data Buoy Center (NDBC) to ensure the uninterrupted operation of a remote weather observing system in a severe marine environment. The NDBC was also given the task of outfitting the network with environmental data systems having proven basic measurement capabilities, but with provisions to accommodate expansion to meet NWS desired meteorological observations when appropriate sensors become available.

Buoy observations have been converted to the DSI-1129 format and stored in that file since January 1, 1970, but are only stored in this file since October 1, 1979. The conversion process does not, however, include wave spectra data. The Coastal-Marine Automated Network (C-MAN) data were added to this file in March 1983, but most of the 40 odd C-MAN stations were established in 1984.

Meteorological observations are not the only data recorded by NDBC BUOY and C-

MAN stations. Oceanographic observations on such parameters as salinity, sub-surface temperatures, and ocean currents are also measured. These data are available from the [National Oceanographic Data Center](#).

## 2. Element Names and Definitions:

Record 1 - Descriptive Header Record  
 Record 2 - Environmental Record  
 Record 3 - Wave Spectra Record  
 Record 4 - Subsurface Temperature Record  
 Record 5 - Subsurface Data Record  
 Record 6 - CO and QUAD Spectra for Directional Waves  
 Record 7 - Angular Fourier Coefficients for Directional Waves  
 Record 8 - Direction/Wave Data  
 Record 9 - Continuous Wind Measurement

Special Note: Records 1 through 5 are presented on most of the tapes. Records 6, 7, and 8 are seldom sent to NCDC.

Beginning with the May 1991 data, the record types and descriptions were changed. They are as follows:

Record A - Descriptive Header Record  
 Record B - Environmental Record  
 Record C - Wave Spectra Data Record  
 Record D - Subsurface Temperature/Salinity Data Record  
 Record E - Subsurface Current Data Record  
 Record F - Subsurface Data Profile Record  
 Record G - Wave Spectra Data Record 2  
 Record H - Wave Fourier Data Record  
 Record I - Directional Wave Parameter Record  
 Record J - Continuous Wind Measurement

### RECORD 1 - DESCRIPTIVE HEADER RECORD

ELEMENT NAME	TAPE RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
File-Type	1-3	A3	"191 Constant Prior To 5/91
Generation-Date	4-9	3i2	Year, Month, Day Of File Generation
Record-Type	10	A1	"1" Descriptive Header Record
Buoy-Station-Name	11-16	A6	Unique Name Of Observation Point
Observed-Date	17-22	3i2	Year, Month, Day Of The Observation Date (UTC)
Observed-Time	23-26	2i2	Hours, Minutes Of The Observation Time (UTC)
Latitude	27-32	3i2	Degrees, Minutes, Seconds
Latitude-Hemisphere	33	A1	"N" Or "S" Hemisphere
Longitude	34-40	I3, 2i2	Degrees, Minutes, Seconds
Longitude-Hemisphere	41	A1	"E" Or "W" Hemisphere
Bottom-Depth	42-46	I5	Depth Of Bottom In Meters To 10ths
Magnetic-Variation	47-50	I4	Magnetic Direction From True North in Whole Degrees (Signed Value)
Buoy-Heading	51-53	I3	Buoy Direction From True North In Whole Degrees
Wave-Sampling-Rate	54-57	I4	Original Wave Measurements In

(Buoy Only)			Minutes To 10ths
Wave-Sampling-Duration (Buoy Only)	58-61	I4	Original Wave Duration In Minutes To 100ths
Wave-Total-Intervals (Buoy Only)	62-64	I3	Total Number Of Wave Frequency Intervals
Chief Scientist	65-84	A20	Name Of Chief Scientist (Optional)
Institution	85-104	A20	Institution Providing This Data Source
Wind-Sampling-Duration	105-107	I3	Duration Of Wind Sample In Minutes And 10ths
Comments	108-120	A13	Additional Comments

## **RECORD 2 - ENVIRONMENTAL DATA RECORD**

ELEMENT NAME	TAPE RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
File-Type	1-3	A3	"191" Constant Prior To 5/91
Generation-Date	4-9	3i2	Year, Month, Day Of File Generations
Record-Type	10	A1	"2" Environmental Data Record Only
Buoy-Station-Name	11-16	A6	Unique Name Of Observation Point
Observed-Date	17-22	3i2	Year, Month, Day Of The Observation Date (UTC)
Observed-Time	23-26	2i2	Hours, Minutes Of The Observation Time (UTC)
Anemometer-Height	27-29	I3	Height Above Water Level Or Ground In Meters To 10ths
Air-Temp	30-33	I4	Air Temperature, Celsius To 10ths (Begin Feb 86 The Sign Is Floating)
Dew-Point	34-37	I4	Dew Point Temperature, Celsius To 10ths (Begin Feb 86 The Sign Is Floating)
Barometer	38-42	I5	Barometer Reading Reduced To Sea Level, Millibars To 10ths
Wind-Speed (Avg)	43-46	I4	Wind Speed, Meters/Sec To 100ths
Wind-Direction (Avg)	47-50	I4	Wind Direction From True North, Degrees To 10ths
Current-Weather	51	I1	Current Weather (Wmo Code 4501)
Visibility	52-54	I3	Visibility, Nautical Miles To 10ths
Precipitation	55-58	I4	Precipitation, In Millimeters
Solar-Radiation	59-61	I3	Solar Radiation, Wave Length Less Than 3.6 Langleys/Min To 100ths
Solar-Radiation 2	62-64	I3	Solar Radiation, Wave Length 4.0 To 50 Microns, Langleys/Min To 100ths
Sig-Wave-Height	65-67	I3	Significant Height Of Wave, Meters To 10ths
Avg-Wave-Period	68-70	I3	Average Period Of Wave, Seconds To 10ths
Dominant-Wave-Dir	71-73	I3	Direction Of Predominant Waves, Whole Degrees From True North
Highest-Wv-Crest	74-76	I3	Highest Wave Crest From Reference Level, Meters To 10ths
Deepest-Trough	77-79	I3	Deepest Wave Trough From Reference Level, Meters To 10ths
Sea-Sfc-Temp	80-83	I4	Sea Surface Temperature, Degrees Celsius To 100ths
Sea-Sfc-Salinity	84-88	I5	Sea Surface Level Of Salinity,

Conductivity	89-93	I5	Parts Per Thousand To 1000ths Unit Measure Of Electrical Conduction, Mhos/Cm To 1000ths (Mhos=Reciprocal Ohms)
Dominant-Wave-Period	94-96	I3	Dominate Period Of Wave, Seconds To 10ths
Max-Wave-Height	97-99	I3	Height Of Maximum Wave, Meters To 10ths
Max-Wave-Steepness	100-102	I3	Maximum Wave Steepness Is The Maximum Ratio Of Wave Height To Wave Length
Peak-Wind-Gust	103-106	I4	Peak Wind Gust, Meters/Sec To 100ths
Wind-Gust-Avg-Pd	107-108	I2	Wind Gust Averaging Period, Seconds
Wind-Gust	109-112	I4	Wind Gust, Meters/Sec To 100ths
Wind-Gust-Time	113-114	I2	Time Of Wind Gust, Seconds
Avg-58-Wind-Speed	115-117	I3	Average 58 Minute Wind Speed, Meters/Sec To 10ths
Avg-58-Wind-Dir	118-120	I3	Average 58 Minute Wind Direction, Whole Degrees

Note: Significant Wave Height, Average Wave Period, And Dominant Wave Period Are Set To Zero When Significant Wave Height Is Less Than 0.15 Meters. Wind-Speed And Wind-Direction were added on 3/30/81.

### **RECORD 3 - WAVE SPECTRA DATA RECORD**

ELEMENT NAME	TAPE RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
File-Type	1-3	A3	"191" Constant Prior To 5/91
Generation-Date	4-9	3i2	Year, Month, Day Of File Generation
Record-Type	10	A1	"3" Wave Spectra Data Only
Buoy-Station-Name	11-16	A6	Unique Name Of Observation Point
Observed-Date	17-22	3i2	Year, Month, Day Of The Observation Date (UTC)
Observed-Time	23-26	2i2	Hours, Minutes Of The Observation Time (UTC)
Nmbr-Spectra-Frqncs- Per-Direction	27-29	I3	Total Number Of Spectra Frequencies In This Direction Or A Zero For Non-Directional Spectra
Spectra-Direction- Per-Frequencies	30-33	I4	Direction Of Spectra Frequencies On This Record Or Blank For Non- Directional Spectra, Degrees To 10ths From True North.
Count-Wv-Frqncs	34	I1	Number Of Spectra Frequencies On This Record
Data-Fields	35-104	5(2i4,I6)	Up To 5 Frequencies, Resolution Density Fields. Null Fields Are Left Blank.
Wave-Frequency	35-38 49-52 63-66 77-80 91-94	I4	Center Frequency Of Interval, Hertz To 1000ths
Wave-Resolution	39-42 53-56	I4	Resolution Of Interval, Hertz To Ten-Thousandths

	67-70		
	81-84		
	95-98		
Wave-Density	43-48	I6	Spectral Density Of Interval,
	57-62		M(2)/Hz To 1000ths
	71-76		
	85-90		
	99-104		
Blanks	105-120	16x	Blanks Used To Fill The Fixed Length Record

#### **Record 4 - Subsurface-Temperature-Data-Record**

Element Name	Tape Record Position	Fortran Attributes	Element Description
File-Type	1-3	A3	"191" Constant Prior To 5/91
Generation-Date	4-9	3i2	Year, Month, Day Of File Generation
Record-Type	10	A1	"4" Subsurface Temperature Data Record Only
Buoy-Station-Name	11-16	A6	Unique Name Of Observation Point
Observed-Date	17-22	3i2	Year, Month, Day (UTC)
Observed-Time	23-26	2i2	Hours, Minutes (UTC)
Data	27-116	10(I5,I4)	Up To 10 Depth And Temperature Fields
Depth-Observed- Level	27-31 36-40 45-49 54-58 63-67 72-76 81-85 90-94 99-103 108-112	I5	Depth Of Observation Level, Meters To 10ths
Temperature-At- Observed-Level	32-35 41-44 50-53 59-62 68-71 77-80 86-89 95-98 104-107 113-116 117-120	I4	Subsurface Temperature For Each Specified Level (Sea Surface Is Included), Degrees Celsius To 100ths.
Blanks		4x	Blanks Used To Fill The Fixed Length Of Record

#### **RECORD 5 - SUBSURFACE DATA RECORD**

ELEMENT NAME	TAPE RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
File-Type	1-3	A3	"191" Constant Prior To 5/91
Generation-Date	4-9	3i2	Year, Month, Day Of File Generation
Record-Type	10	A1	"5" Subsurface Data Record Only
Buoy-Station-Name	11-16	A6	Unique Name Of Observation Point
Observed-Date	17-22	3i2	Year, Month, Day Of The

Observed-Time	23-26	212	Observation Date (UTC) Hours, Minutes Of The Observation Time (UTC)
Data	27-116	3(I5,I5, I5,I5,	Up To 3 Depth, U Component, V Component, Pressure, Conductivity, Salinity Fields
Depth-Observed Level	27-31 57-61 87-91	I5	The Depth Of The Observation Level, Meters To 10ths
U-Component-At- Level	32-36 62-66 92-96	I5	East Vector, Cm/Sec To 10ths
V-Component-At Level	37-41 67-71 97-101	I5	True North Vector, Cm/Sec To Level
Pressure-At-Level	42-46 72-76 102-106	I5	Pressure At Specified Level, Kg/Cm524 To 100ths
Conductivity-At- Level	47-51 77-81 107-111	I5	Conductivity At Specified Level, Mhos/Cm To 1000th
Salinity-At-Level	52-56 82-86 112-116	I5	Salinity At Specified Level, Parts Per 1000 To 1000ths
Blanks	117-120	4x	Blanks Used To Fill The Fixed Length Record.

**RECORD 6 - CO AND QUAD SPECTRA FOR DIRECTIONAL WAVES (Began 2/28/81)**

ELEMENT NAME	RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
File-type	1-3	a3	"191" constant prior to 5/91
Blank	4-9	6x	blanks only
Record-type	10	a1	"6" co and quad spectra for directional waves only
Buoy-station-name	11-16	a6	unique name of observation point
Observed-date	17-22	3i2	year, month, day of the observation date (UTC)
Observed-time	23-26	212	hours, minutes of the observation time (UTC)
Frequency-of-center- spectra	27-30	i4	center spectra frequency of inter- val, hz to .001
Spectral-resolution- of frqncy-band	31-35	i5	spectral resolution of the frequency band specified in col. 27-30, hz to ten thousandths
Co-spectra-cl1	36-41	i6	up to 9 uncorrected values of co Signed and quad spectra in meters squared/hz. These spectra are in this order: c4115, c4225, c4335, c4125, q4125, c4135, q4135, c4235, and q4235.

Subscripts are defined  
1 = heave  
2 = e-w slope  
3 = n-s slope  
If the exponent is less than -9  
the exponent and its associated  
spectra should be zero.



Exponent-c4115	42-43	i2	exponent for co-spectra c4115
Co-spectra-c4225	44-49	i6	co-spectra for c4225
Exponent-c4225	50-51	i2	
Co-spectra-c4335	52-57	i6	
Exponent-c4335	58-59	i2	
Co-spectra-c4125	60-65	i6	
Exponent-c4125	66-67	i2	
Quad-spectra-q4125	68-73	i6	
Exponent-q4125	74-75	i2	
Co-spectra-c4135	76-81	i6	
Exponent-c4135	82-83	i2	
Quad-spectra-q4135	84-89	i6	
Exponent-q4135	90-91	i2	
Co-spectra-c4235	92-97	i6	
Exponent-c4235	98-99	i2	
Quad-spectra-q4235	100-105	i6	
Exponent-q4235	106-107	i2	
Spectra-c4225-c4335	108-113	i6	
Exponent-c4225-c4335	114-115	i2	
Blanks	116-120	5x	blanks used to fill in fixed records.

**RECORD 7 - ANGULAR FOURIER COEFFICIENTS FOR DIRECTIONAL WAVES (Began 12/28/81)**

ELEMENT NAME	TAPE RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
File-Type	1-3	A3	"191" Constant Prior To 5/91
Blank	4-9	6x	Blanks Only
Record-Type	10	A1	"7" Angular Coefficients For Directional Waves Only
Buoy-Station-Name	11-16	A6	Unique Name Of Observation Point
Observed-Date	17-22	3i2	Year, Month, Day Of The Observation Date (UTC)
Observed-Time	23-26	212	Hours, Minutes Of The Observation Time (UTC)
Frequency-Of-Center-Spectra	27-30	I4	Center Spectra Frequency Of Interval, Hz To .001
Spectral-Resolution-Of-Frqncy-Band	31-35	I5	Spectral Resolution Of The Frequency Band Specified In Col. 27-30, Hz To Ten Thousandths
Angular-Fourier-A405	36-41	I6 Signed	Up To 9 Corrected Values Of The Angular Fourier Coefficients, Meters 524/Hz. The Order Of These Coefficients Is A405,A415, B415, A425, B425, A435, B435 A445, And B445.
Exponent-A405	42-43	I2	Exponent For Angular Fourier A405
Angular-Fourier-A415	44-49	I6	Coefficient-A415
Exponent-A415	50-51	I2	
Angular-Fourier-B415	52-57	I6	Coefficient-B415
Exponent-B415	58-59	I2	
Angular-Fourier-A425	60-65	I6	Coefficient-A425
Exponent-A425	66-67	I2	
Angular-Fourier-B425	68-73	I6	Coefficient-B425
Exponent-B425	74-75	I2	
Angular-Fourier-A435	76-81	I6	Coefficient-A435
Exponent-A435	82-83	I2	
Angular-Fourier-B435	84-89	I6	Coefficient-B435
Exponent-B435	90-91	I2	
Angular-Fourier-A445	92-97	I6	Coefficient-A445

Exponent-A445	98-99	I2	
Angular-Fourier-B445	100-105	I6	Coefficient-B445
Exponent-B445	106-107	I2	
Mean-Wave-Dir	108-110	I3	Mean Wave Direction Given By Arctan B415/A415 In Whole Degrees From True North. (This Is An Optional Entry.)
Blanks	111-120	10x	Blanks Are Used To Fill In Fixed Record.

**Record 8 - Directional Wave Spectra (Began 11/4/85)**

ELEMENT NAME	TAPE RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
File-Type	1-3	A3	"191" Constant Prior To 5/91
Generation-Date	4-9	3i2	Year, Month, Day Of File Generation
Record-Type	10	A1	"8" Directional Wave Spectra Data Only
Buoy-Station-Name	11-16	A6	Unique Name Of Observation Point
Observed-Date	17-22	3i2	Year, Month, Day Of The Observation Date (UTC)
Observed-Time	23-26	212	Hours, Minutes Of The Observation Time (UTC)
Frgncy-Count	27	I1	The Number Of Frequencies Used Record 8. Usually Will Be 1, 2, Or 3
Frequency-Of-Center-	28-31	I4	Center Spectra Frequency Of Inter- Spectra-Num-1 Val, Hz To Ten Thousandths. 1st Frequency.
Spectral-Resolution- Of-Frgncy-Band-1	32-35	I4	Spectral Resolution Of The Frequency Band Specified In Columns 28-31, Hz To Ten Thousandths
R1	5 36-39	I4	Value (Dimensionless) In Formulas To Determine Directional Wave Spectra For The 1st Frequency Band. Recorded To Nearest Hundredth. See Note At End Of Format For Record 8.
R2	40-43	I4	Value (Dimensionless) Used In Formulas To Determine Directional Wave Spectra For The 1st Frequency Band. Recorded To Nearest Hundredth. See Note At End Of Format For Record 8.
A1	44-47	I4	The Mean Wave Directional Value Used In Formulas To Determine Direct- Ional Wave Spectra For 1st Fre- Quency Band. A1 = Arctan (B1, A1). Recorded In Degrees To Tenths. See Note At End Of Format For Record 8.
A2	48-51	I4	The Principal Wave Direction Value Used In Formulas To Determine Directional Wave Spectra For 1st Frequency Band. $A2 = (1/2)Arctan(B2,A2) + 0 \text{ Or } \pi$ .

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			Recorded In Degrees To Tenths. See Note At End Of Format For Record 8.
C11s	52-57	I6	Value Used In Formulas To Determine Directional Wave Spectra For The 1st Frequency Band. Recorded In Meters Squared/Hz To Thousandths. See Note At End Of Format For Record 8.
Frgncy-Of-Center- Spectra-Num-2	58-61	I4	The 2nd Center Spectra Frequency Of Interval In Hz To Ten Thousandths. Blanks = No Data
Spectral-Resolution- Frgncy-Band-2	62-65	I4	The 2nd Spectral Resolution Of Frequency Band Specified In Columns 58-61 In Hz To Ten Thousandths. Blanks = No Data
R1-2nd-Frgncy	66-69	I4	The (2nd) R1 Value. See Note At End Of Format For Record 8. Blanks = No Data
R2-2nd-Frgncy	70-73	I4	The (2nd) R2 Value. See Note At End Of Format For Record 8. Blank = No Data.
A1-2nd-Frgncy	74-77	I4	The (2nd) A1 Value. See Note At End Of Format For Record 8. Blank = No Data
A2-2nd-Frgncy	78-81	I4	The (2nd) A2 Value. See Note At End Of Format For Record 8. Blank = No Data
C11s-2nd-Frgncy	82-87	I6	The (2nd) C11s Value. See Note At End Of Format For Record 8. Blank = No Data
Frgncy-Of-Center- Spectra-Num-3	88-91	I4	The (3rd) Center Spectra Frequency Of Interval In Hz To Ten Thousandths. Blanks = No Data
Spectral-Resolution- Frgncy-Band-3	92-95	I4	The (3rd) Spectral Resolution Of Frequency Band Specified In Columns 88-91 In Hz To Ten Thousandths. Blanks = No Data
R1-3rd-Frgncy	96-99	I4	The (3rd) R1 Value. See Note At End Of Format For Record 8. Blank = No Data
R2-3rd-Frgncy	100-103	I4	The (3rd) R2 Value. See Note At End Of Format For Record 8. Blank = No Data
A1-3rd-Frgncy	104-107	I4	The (3rd) A1 Value. See Note At End Of Format For Record 8. Blank = No Data
A2-3rd-Frgncy	108-111	I4	The (3rd) A2 Value. See Note At End Of Format For Record 8. Blank = No Data
C11s-3rd Frgncy	112-117	I6	The (3rd) C11s Value. See Note At End Of Format For Record 8. Blank = No Data
Filler	118	1x	Blanks Only

Note: Directional Wave Spectra = S(F,A)\*D(F,A)

F = Freq (Hz)



Speed			
Fifth Average	71-73	I3	Whole Degrees
Direction			
Fifth Average	74-76	I3	Meters Per Second To Tenths
Speed			
Sixth Average	77-79	I3	Whole Degrees
Direction			
Sixth Average	80-82	I3	Meters Per Second To Tenths
Speed			

NOTE:

1. Expansion Parameter.
2. Ten-minute average winds are measured for minutes 0-9, 10-19, 20-29, 30-39, 40-49, and 50-59. The first set is for the ten-minute period ending immediately before the End of Acquisition time. The remaining sets go back in time.

Example: If End of Acquisition is 10:25, then the First Average will be for the time period 10:10 to 10:19, and the Second Average will be for the period 10:00 to 10:09. If End of Acquisition is 10:30, then the First Average will be for the time period 10:20-10:29.

**RECORD A - DESCRIPTIVE HEADER RECORD (Began May 1991)**

ELEMENT NAME	TAPE RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
File Name	1-3	A3	"291 Constant (Began 5/91)
Generation-Date	4-9	3i2	Year, Month, Day Of File Generation
Record-Type	10	A1	"A" Descriptive Header Record
Buoy-Station-Name	11-16	A6	Unique Name Of Observation Point
Observed-Date	17-22	3i2	Year, Month, Day Of The Observation Date (UTC)
Observed-Time	23-26	2i2	Hours, Minutes Of The Observation Time (UTC)
Latitude	27-32	3i2	Degrees, Minutes, Seconds
Latitude-Hemisphere	33	A1	"N" Or "S" Hemisphere
Longitude	34-40	I3, 2i2	Degrees, Minutes, Seconds
Longitude-Hemisphere	41	A1	"N" Or "S" Hemisphere
Bottom-Depth	42-46	I5	Depth Of Bottom In Meters To 10ths
Magnetic-Variation	47-50	I4	Magnetic Direction From True North In Whole Degrees (Signed Value)
Buoy-Heading	51-53	I3	Buoy Direction From True North In Whole Degrees
Wave-Sampling-Rate (Buoy Only)	54-57	I4	Original Wave Measurements In Minutes To 10ths
Wave-Sampling- Duration (Buoy Only)	58-61	I4	Original Wave Duration In Minutes To 100ths
Wave-Total-Intervals (Buoy Only)	62-64	I3	Total Number Of Wave Frequency Intervals
Chief Scientist	65-84	A20	Name Of Chief Scientist (Optional)
Institution	85-104	A20	Institution Providing This Data Source
Wind-Sampling- Duration	105-107	I3	Duration Of Wind Sample In Minutes And 10ths
Presence-Of-Record-B	108	A1	Y=Yes; N=No
Presence-Of-Record-C	109	A1	Y=Yes; N=No
Presence-Of-Record-D	110	A1	Y=Yes; N=No
Presence-Of-Record-E	111	A1	Y=Yes; N=No
Presence-Of-Record-F	112	A1	Y=Yes; N=No

Presence-Of-Record-G	113	A1	Y=Yes; N=No
Presence-Of-Record-H	114	A1	Y=Yes; N=No
Presence-Of-Record-I	115	A1	Y=Yes; N=No
Presence-Of-Record-J	116	A1	Y=Yes; N=No
Blanks	117-120	4x	Blanks

**RECORD B - ENVIRONMENT DATA RECORD (Began May 1991)**

ELEMENT NAME	TAPE RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
File-Type	1-3	A3	"291" Constant (Began 5/91)
Generation-Date	4-9	3i2	Year, Month, Day Of File Generations
Record-Type	10	A1	"B" Environmental Data Record
Buoy-Station-Name	11-16	A6	Unique Name Of Observation Point
Observed-Date	17-22	3i2	Year, Month, Day Of The Observation Date (UTC)
Observed-Time	23-26	2i2	Hours, Minutes Of The Observation Time (UTC)
Anemometer-Height	27-29	I3	Height Above Water Level Or Ground In Meters To Tenths
Air-Temp	30-33	I4	Air Temperature, Celsius To 10ths (Negative Temps Preceded By A Minus Sign)
Dew-Point	34-37	I4	Dew Point Temperature, Celsius To 10ths
Barometer	38-42	I5	Barometer Reading Reduced To Sea Level, Millibars To 10ths
Wind-Speed (Avg)	43-46	I4	Average Wind Speed In Meters/Sec To 100ths
Wind-Direction (Avg)	47-50	I4	Wind Direction From True North, Degrees To 10ths
Weather	51	I1	Current Weather - Code 0108 Used
Visibility	52-54	I3	Visibility, Nautical Miles To 10ths
Precipitation	55-58	I4	Precipitation, Accumulation In Millimeters
Solar-Radiation	59-61	I3	Langleys/Min To 100ths, Wave Length <3.6 Microns
Solar-Radiation 2	62-64	I3	Langleys/Min To 100ths, Wave Length 4.0 To 50 Microns
Sig-Wave-Height	65-67	I3	Significant Wave Height Corrected For Low Frequency Noise, Meters To 10ths
Avg-Wave-Period	68-70	I3	Average Period Of Wave, Seconds To 10ths
Mean-Wave-Dir	71-73	I3	Mean Direction Of Dominant Waves In Whole Degrees From True North
Water-Level	74-77	I3	From Mllw Reference Level, Minus Sign Indicates Below Mllw, Meters To 10ths
Blanks	78-79	2x	Blanks
Sea-Sfc-Temp	80-83	I4	Sea Surface Temperature, Degrees Celsius To 100ths
Sea-Sfc-Salinity	84-88	I5	Sea Surface Level Of Salinity, Parts Per Thousand To 1000ths
Sea-Sfc-Conductivity	89-93	I5	Unit Measure Of Electrical Conduction, Mhos/Cm To 1000ths (Mhos=Reciprocal Ohms)
Dominant-Wave-Period	94-96	I3	Dominate Period Of Wave, Seconds

Max-Wave-Height	97-99	I3	To 10ths Maximum Wave Height, Meters To 10ths
Max-Wave-Steepness	100-102	I3	Maximum Wave Steepness Is The Maximum Ratio Of Wave Height To Wave Length
Peak-Wind-Gust	103-106	I4	Peak Wind Gust, Meters/Sec To 100ths

**RECORD B - ENVIRONMENTAL DATA RECORD (Began May 1991)(Continued)**

ELEMENT NAME	TAPE RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
Wind-Gust-Avg-Pd	107-108	I2	Wind Gust Averaging Period, Seconds
Wind-Gust	109-112	I4	Wind Gust, Meters/Second To 100ths
Wind-Gust-Avg-Pd2	113-114	I2	Wind Gust Averaging Period, Seconds
Avg-58-Wind-Speed	115-117	I3	Average 58 Minute Wind Speed, Meters/Second To 10ths
Avg-58-Wind-Dir Non-Directional	118-120	I3	Average 58 Minute Wind Direction, Whole Degrees

NOTE: Significant wave height, average wave period, and dominant wave period are set to zero when significant wave height is less than 0.15 meters.

**RECORD C - NON-DIRECTIONAL WAVE SPECTRAL DATA RECORD**

ELEMENT NAME	TAPE RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
File-Type	1-3	A3	"291" Constant (Began 5/91)
Generation-Date	4-9	3i2	Year, Month, Day Of File Generation
Record-Type	10	A1	"C" Non-Directional Wave Spectral Data
Buoy-Station-Name	11-16	A6	Unique Name Of Observation Point
Observed-Date	17-22	3i2	Year, Month, Day Of The Observation Date (UTC)
Observed-Time	23-26	2i2	Hours, Minutes Of The Observation Time (UTC)
Blanks	27-33	7x	Blanks
Count	34	I1	Number Of Frequencies On This Record And Density Fields Up To 5 Frequency, Resolution. Null Fields Are Zero Or Blank
Frequency	35-38	I4	Center Frequency Of Interval In Hertz To 1000ths
Resolution	39-42	I4	Interval Width In Hertz To 10,000ths
Density	43-48	I6	Spectral Density Of Interval In Mz/Hz To 1000ths

Frequency, Resolution, And Density May Be Repeated Up To Four Times Through Tape Record Position 104; Same Descriptions As Above.

Blanks	105-120	16x	Blanks
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**RECORD D - SUBSURFACE TEMP/SALINITY DATA RECORD**

ELEMENT NAME	TAPE RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
File-Type	1-3	A3	"291" Constant (Began 5/91)
Generation-Date	4-9	3i2	Year, Month, Day Of File Generation
Record-Type	10	A1	"D" Subsurface Temp/Salinity Data
Buoy-Station-Name	11-16	A6	Unique Name Of Observation Point
Observed-Date	17-22	3i2	Year, Month, Day Of The Observation Date (UTC)
Observed-Time	23-26	212	Hours, Minutes Of The Observation Time (UTC)
Data Practical	27-116	5(I5,I4,	Up To 5 Depth, Temperature,
Depth	27-31 45-49 63-67 81-85 99-103	I5,I4) I5	Salinity, Conductivity Fields Meters From The Surface In loths
Temperature	32-35 50-53	I4	Subsurface Temperature For Each Specified Level. (Sea Surface
Is	68-71		Included), Negative Temps
Preceeded	86-89		By A Minus Sign Adjacent To
Temp.	104-107		Degrees Celsius To 100ths
Practical-Salinity	36-40 54-58 72-76 90-94 108-112		Reported To 1000ths
Conductivity	41-44 59-62 77-80 95-98 113-116	I4	Millisiemens/Cm To 100ths
Blank	117	1x	Blank
Duration-Of- Sampling-Period	118-120	I3	Minutes To 10ths

**RECORD E - SUBSURFACE CURRENT DATA RECORD**

ELEMENT NAME	TAPE RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
File-Type	1-3	A3	"291" Constant (Began 5/91)
Generation-Date	4-9	3i2	Year, Month, Day Of File Generation
Record-Type	10	A1	"E" For Subsurface Current
Buoy-Station-Name	11-16	A6	Unique Name Of Station Point



Observed-Date	17-22	3i2	Year, Month, Day Of The Observation Date (UTC)
Observed-Time	23-26	212	Hours, Minutes Of The Observation Time (UTC)
Data		4(I4,I5, I3) I4	Up To 4 Depth, Pressure, U, V, And W Components From The Surface In Meters
Depth	27-30 49-52 71-74 93-96		
Pressure	31-35 53-57 75-79 97-101	I5	Hydrostatic Pressure (Kg/Cm2) To 100ths
U-Components	36-40 58-62 80-84 102-106	I5	East Component From True North (Cm/Sec) To 10ths. Minus Sign Indicates Westward Component
V-Component	41-45 63-67 85-89 107-111	I5	True North Component In Cm/Sec To 10ths, Minus Sign Indicates Southward Component
W-Component	46-48 68-70 90-92 112-114	I3	Vertical Component In Cm/Sec To 10ths, Minus Sign Indicates Southward Component
Bin-Width	115-116	I2	Width Of Each Depth Bin In Whole Meters
Sampling-Interval	117-119	I3	Minutes To 10ths
Blank	120	1x	Blank

#### **RECORD F - SUBSURFACE DATA PROFILE RECORD**

ELEMENT NAME	TAPE RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
File-Type	1-3	A3	"291" Constant (Began 5/91)
Generation-Date	4-9	3i2	Year, Month, Day Of File Generation
Record-Type	10	A1	"F" For Subsurface Profile
Buoy-Station-Name	11-16	A6	Unique Name Of Station Point
Observed-Date	17-22	3i2	Year, Month, Day Of The Observation Date (UTC)
Observed-Time	23-26	212	Hours, Minutes Of The Observation Time (UTC)
Depth	27-30 50-53 73-76 96-99	I4	From The Surface In Meters. Negative Value Indicates Height In Meters <u>Above</u> Water Surface. Repeated In Descending Order.
Photosynthetic Active Radiation (Par)	31-34 54-57 77-80 100-103	I4	Micromol/Sec/M <sup>2</sup> Repeated In Descending Order.
Blanks	35-49 58-72	15x	15 Blanks Reserved For Future Parameters Repeated In
Descending	81-95 104-118		Order.
Blanks	119-120	2x	Blanks.

# RECORD G - CO AND QUAD SPECTRA FOR DIRECTIONAL WAVES DATA RECORD

ELEMENT NAME	TAPE RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
File-Type	1-3	A3	"291" Constant Beginning 5/91
Generation-Date	4-9	3i2	Year, Month, Day Of File Generation
Record-Type	10	A1	"G" For Co And Quad Spectral For Directional Waves
Buoy-Station-Name	11-16	A6	Unique Name Of Station Point
Observed-Date	17-22	3i2	Year, Month, Day Of Observation Date (UTC)
Observed-Time	23-26	212	Hours, Minutes Of The Observation Time (UTC)
Frequency	27-30	I4	Center Frequency Of Interval In Hz To 1,000ths
Resolution	31-35	I5	Spectral Resolution Of This Frequency Band To Hz To 10,000ths
Co-Spectra (C11)	36-41	I6	Uncorrected Value Of Co And Quad Spectra In M <sup>2</sup> /Hz. Decimal Assumed To Be Left Of First Digit. Subscripts Are 1 - Heave, 2 - E-W Slope, 3 - N-S Slope
Exponent*	42-43	I2	First Position Is The Sign
Co-Spectra (C22)	44-49	I6	See Co-Spectra (C11)
Exponent*	50-51	I2	
Co-Spectra (C33)	52-57	I6	See Co-Spectra (C11)
Exponent*	42-43	I2	First Position Is The Sign
Co-Spectra (C22)	44-49	I6	See Co-Spectra (C11)
Exponent*	50-51	I2	
Co-Spectra (C33)	52-57	I6	See Co-Spectra (C11)
Exponent*	58-59	I2	
Co-Spectra (C12)	60-65	I6	See Co-Spectra (C11)
Exponent*	66-67	I2	
Quad-Spectra (Q12)	68-73	I6	See Co-Spectra (C11)
Exponent*	74-75	I2	
Co-Spectra (C13)	76-81	I6	See Co-Spectra (C11)
Exponent*	82-83	I2	
Quad-Spectra (Q13)	84-89	I6	See Co-Spectra (C11)
Exponent*	90-91	I2	
Co-Spectra (C23)	92-97	I6	See Co-Spectra (C11)
Exponent*	98-99	I2	
Quad-Spectra (Q23)	100-105	I6	See Co-Spectra (C11)
Exponent*	106-107	I2	
Spectra (C22-C33)	108-113	I6	See Co-Spectra (C11)
Exponent*	114-115	I2	
Blanks	116-120	6x	Blanks

\*IF THE EXPONENT IS LESS THAN -9, THE EXPONENT AND ITS ASSOCIATED SPECTRA WILL BE ZERO.

**RECORD H - DIRECTIONAL WAVE FOURIER COEFFICIENT DATA RECORD**

ELEMENT NAME	TAPE RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
File-Type	1-3	A3	"291" Constant Beginning 5/91
Generation-Date	4-9	3i2	Year, Month, Day Of File Generation
Record-Type	10	A1	"H" For Directional Wave Fourier Coefficient Data
Buoy-Station-Name	11-16	A6	Unique Name Of Station Point
Observed-Date	17-22	3i2	Year, Month, Day Of The Observation (UTC)
Observed-Time	23-26	212	Hours, Minutes Of The Observation Time (UTC)
Frequency	27-30	I4	Hz To 1,000ths
Resolution	31-35	I5	Hz To 10,000ths
Angular-Fourier Coeff(A <sub>0</sub> )	36-41	I6	M <sup>2</sup> /Hz
Exponent	42-43	I2	
Angular-Fourier Coeff(A <sub>1</sub> )	44-49	I6	M <sup>2</sup> /Hz
Exponent	50-51	I2	
Angular-Fourier Coeff(B <sub>1</sub> )	52-57	I6	M <sup>2</sup> /Hz
Exponent	58-59	I2	
Angular-Fourier Coeff(A <sub>2</sub> )	60-65	I6	M <sup>2</sup> /Hz
Exponent	66-67	I2	
Angular-Fourier Coeff(B <sub>2</sub> )	68-73	I6	M <sup>2</sup> /Hz
Exponent	74-75	I2	
Angular-Fourier Coeff(A <sub>3</sub> )	76-81	I6	M <sup>2</sup> /Hz
Exponent	82-83	I2	
Angular-Fourier Coeff(B <sub>3</sub> )	84-89	I6	M <sup>2</sup> /Hz
Exponent	90-91	I2	
Angular-Fourier Coeff(A <sub>4</sub> )	92-97	I6	M <sup>2</sup> /Hz
Exponent	98-99	I2	
Angular-Fourier Coeff(B <sub>4</sub> )	100-105	I6	M <sup>2</sup> /Hz
Exponent	106-107	I2	
Mean-Wave-Dir	108-110	I3	Arctan B <sub>1</sub> /9 <sub>1</sub> In Whole Degrees From True North.
Blanks	111-120	10x	Blanks

**RECORD I - DIRECTIONAL WAVE PARAMETER DATA RECORD**

ELEMENT NAME	TAPE RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
File-Type	1-3	A3	"291" Constant Beginning 5/91
Generation-Date	4-9	3i2	Year, Month, Day Of File Generation
Record-Type	10	A1	"I" For Directional Wave Parameter Data

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Buoy-Station-Name	11-16	A6	Unique Name Of Station Point
Observed-Date	17-22	3i2	Year, Month, Day Of The Observation Date (UTC)
Observed-Time	23-26	212	Hours, Minutes Of The Observation Time (UTC)
Count	27	I1	Number Of Frequencies On This Record (1 To 3)
Frequency	28-31	I4	Center Of Frequency Interval In Hz To 10,000ths
Resolution	32-35	I4	Resolution Of Interval In Hz To 10,000ths
R1	36-39	I4	Nondimensional. To Nearest 100th
R2	40-43	I4	Same As R1
Wave-Direction-Alpha1	44-47	I4	Direction In Degrees To The 10th
Wave-Direction-Aplha2	48-51	I4	Direction In Degrees To The 10th
Wave C11 Estimate	52-57	I6	Spectral Value In M <sup>2</sup> /Hz To The 1000ths
Frequency	58-61	I4	Center Of Frequency Interval In Hz To The 10,000ths
Resolution	62-65	I4	Resolution Of Interval In Hz To The 10,000ths
R1	66-69	I4	Nondimensional. Given To Nearest 100th
R2	70-73	I4	Nondimensional. Given To Nearest 100th
Wave-Direction-Alpha1	74-77	I4	Direction In Degrees To The 10th
Wave-Direction-Alpha2	78-81	I4	Direction In Degrees To The 10th
Wave C11 Estimate	82-87	I6	Spectral Value In M <sup>2</sup> /Hz To The 1000th
Frequency	88-91	I4	Center Of Frequency Interval In Hz To The 10,000th
Resolution	92-95	I4	Resolution Of Interval In Hz To The 10,000th
R1	96-99	I4	Nondimensional. Given To The Nearest 100th
R2	100-103	I4	Nondimensional. Given To The Nearest 100th
Wave-Direction-Alpha1	104-107	I4	Direction In Degrees To 10th
Wave-Direction-Alpha2	108-111	I4	Direction In Degrees To 10th
Wave-C11-Estimate	112-117	I6	Spectral Value To M <sup>2</sup> /Hz To The 1,000th
Blanks	118-120	3x	Blanks

Note: Directional Wave Spectrum = C11(F) \*D(F,A), F = Frequency (Hz), A = Azimuth Angle Measured Clockwise From North To The Direction Wave Is From.  $D(F,A) = (1/\pi) * (0.5 + R1 * \cos(A - \alpha_1) + R2 * \cos(2 * (A - \alpha_2)))$ , In Which R1 And R2 Are Dimenisonless And Alpha1 And Alpha2 Are Respectively Mean An Principal Wave Directions. In Terms Of Longuet-Higgins-Fourier Coefficients  $R1 = (\text{Sort}(A, *A_1 + B_1 * B_1)) / A_0$ ,  $R2 = (\text{Sort}(A_2 * A_2 + B_2 * B_2)) / A_0$ ,  $\alpha_1 = \arctan(B_1, A_1)$ ,  $\alpha_2 = 0.5 * \arctan(B_2, A_2) + 0$ . Or 180., C11(F) Is The Nondirectional Wave Spectra Data From Record C.

#### RECORD J - CONTINUOUS WIND MEASUREMENT DATA RECORD

ELEMENT NAME	TAPE RECORD POSITION	FORTTRAN ATTRIBUTES	ELEMENT DESCRIPTION
File-Type	1-3	A3	"291" Constant Beginning 5/91
Generation-Date	4-9	3i2	Year, Month, Day Of File Generation

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Record-Type	10	A1	"J" For Continuous Wind Measurement Data Record
Buoy-Station-Name	11-16	A6	Unique Name Of Station Point
Report-Date	17-22	3i2	Year, Month, Day Of Report (UTC)
Report-Time	23-26	2i2	Hours, Minutes Of The Report (UTC)
Speed-Averaging- Method	27	I1	1 = Vector, 2 = Scaler
Standard-Deviation Of Hourly Speed	28-30	I3	M/Sec To 10ths
Standard-Deviation Of Hourly Direction	31-34	I4	Whole Degrees
Hourly-Peak-Wind	35-37	I3	M/Sec To 10ths (Highest 5 Sec Wind)
Direction-Of-Hourly Peak	38-40	I3	Whole Degrees
Minute-Of-Hourly Peak	41-42	I2	Minutes
End-Of-Acquisition Time	43-46	2i2	Hours, Minutes (UTC)
First-Average- Direction	47-49	I3	Whole Degrees
First-Average-Speed	50-52	I3	M/Sec To 10ths
Second-Average- Direction	53-55	I3	Whole Degrees
Second-Average-Speed	56-58	I3	M/Sec To 10ths
Third-Average- Direction	59-61	I3	Whole Degrees
Third-Average-Speed	62-64	I3	M/Sec To 10ths
Fourth-Average- Direction	65-67	I3	Whole Degrees
Fourth-Average-Speed	68-70	I3	M/Sec To 10ths
Fifth-Average- Direction	71-73	I3	Whole Degrees
Fifth-Average-Speed	74-76	I3	M/Sec To 10ths
Sixth-Average- Direction	77-79	I3	Whole Degrees
Sixth-Average-Speed	80-82	I3	M/Sec To 10ths
Blanks	83-120	38x	Blanks

Note: ten minute average winds are measured for minutes 0-9, 10-19, 20-29, 30-39, 40-49, and 50-59. The first set is for the ten minute time period ending immediately before the end of acquisition time. The remaining sets go back in time. For example, if the end of acquisition time is 1025, the first average is 1010 to 1019; the second, 1000 to 1009, etc. If the end of acquisition time is 1030, then the first period will be 1020 to 1029.

3. **Start Date:** Varies by buoy. See site below for additional information.

[http://www.ndbc.noaa.gov/Data\\_availability/data\\_avail.shtml](http://www.ndbc.noaa.gov/Data_availability/data_avail.shtml)

4. **Stop Date:** Ongoing.

5. **Coverage:** United States coastal marine (BUOY) and headland (C-MAN) stations for the Great Lakes, North Atlantic Ocean, North Pacific Ocean, Gulf of Alaska, Gulf of Mexico, and Hawaiian Islands areas.

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**6. How to Order Data:**

Ask NCDC's Climate Services about the cost of obtaining this data set.  
Phone: 828-271-4800  
FAX: 828-271-4876  
E-mail: [NCDC.Orders@noaa.gov](mailto:NCDC.Orders@noaa.gov)

**7. Archiving Data Center:**

National Climatic Data Center  
Federal Building  
151 Patton Avenue  
Asheville, NC 28801-5001  
Phone: (828) 271-4800.

Data are also stored by the NDBC at <http://www.ndbc.noaa.gov/>

**8. Technical Contact:**

National Climatic Data Center  
Federal Building  
151 Patton Avenue  
Asheville, NC 28801-5001  
Phone: (828) 271-4800.

**9. Known Uncorrected Problems: None.**

**10. Quality Statement:** None provided with the original documentation. See NBDC for additional information.

**11. Essential Companion Datasets: None.**

**12. References:** None provided with the original documentation. See NBDC for additional information.